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MERCHANT & GOULD PC
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903

EXAMINER	
BATTAGLIA, MICHAEL V	
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11

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 09/694,625	Applicant(s) MIZUUCHI ET AL.
	Examiner Michael V Battaglia	Art Unit 2652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 35-50* is/are pending in the application.

4a) Of the above claim(s) *12-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 35-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

This action, dated July 9, 2004, is in response to Applicant's amendment, filed June 4, 2004. Claims 1-50 are pending. Claims 12-34 have been withdrawn from consideration. Previously withdrawn claims 35-50 are no longer withdrawn. Claims 35-50 are reinstated because the amended optical system of claim 35 now requires the specifics of the amended optical information recording medium of claim 1.

Claim Rejections - 35 USC § 103

1. Claims 1-3, 7-8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al (hereafter Yasuda) (US 6,221,455) in view of Hasman et al (hereafter Hasman) (US 5,526,338).

In regard to claim 1, Yasuda discloses an optical information recording medium (Fig. 5, element 10), with respect to which recording and reproduction are performed with laser beams from one side (Fig. 13), comprising at least two recording layers formed of a phase change material (Fig. 5, elements 11-12) on a substrate (Fig. 5, element 2), wherein the recording layers include a first recording layer (Fig. 5, element 12) and a second recording layer (Fig. 5, element 11) in order from the side on which the laser beams are incident (Fig. 13), the first recording layer is included in a first recording medium (Fig. 5, element 6) and the second recording layer is included in a second recording medium (Fig. 5, element 4), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda1$ (nm), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda2$ (nm), a light absorptance of the first recording layer in a crystal state as Ac (%), a light absorptance of the first recording layer in an amorphous state as Aa (%), a

light transmittance of the first recording medium with the first recording layer being in the crystal state as Tc (%), a light transmittance of the first recording medium with the first recording layer being in the amorphous state as Ta (%), and the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ (Col. 22, lines 41, 46, and 57-61) and the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$ (Col. 21, lines 42 and 47), wherein a separation layer (Fig. 5, element 5) is provided between the first recording medium and the second recording medium, and the thickness of the separation layer is in the range between $1\mu m$ and $50\mu m$ (Col. 15, lines 58-59). The examiner notes that in the optical information recording medium of Yasuda, both $\lambda 1$ and $\lambda 2$ are equal to 780nm. Yasuda does not disclose that the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$.

Hasman discloses an optical information recording medium, which is recorded and reproduced by laser beams from one side, comprising at least two recording layers formed of a phase change material on a substrate (Col. 8, lines 60-64), wherein the recording layers include a first recording layer and a second recording layer from the side on which the laser beams are incident, the first recording layer is included in a first recording medium and the second recording layer is included in a second recording medium (Fig. 1, element 4), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda 1$ (nm) (Fig. 1, element $\lambda 2$), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda 2$ (nm) (Fig. 1, element $\lambda 1$). Hasman further discloses that that the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$ (Col. 4, lines 49-52). The examiner notes

that Hasman uses laser beams with different wavelengths to enable parallel readout from multiple discs of the optical information recording medium (Col. 2, lines 19-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the first and second laser beams of Yasuda to have the relationship expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$ as suggested by Hasman, the motivation being to enable parallel readout from multiple discs of the optical information recording medium and greatly reduce access time.

In regard to claim 2, Yasuda in view of Hasman as applied to claim 1 meets the further limitations of claim 2. Yasuda discloses the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ (Col. 22, lines 41, 46, and 57-61) and the first recording medium satisfies conditions of $Tc \geq 45$ and $Ta \geq 45$ with respect to the wavelength $\lambda 2$ (Col. 21, lines 42 and 47). Hasman discloses a relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 50$ (Col. 4, lines 49-52).

In regard to claim 3, Yasuda discloses that the optical recording medium further comprises a protective layer (Fig. 5, element 7), wherein the second recording medium (Fig. 5, element 4), the first recording medium (Fig. 5, element 6), and the protective layer (Fig. 5, element 7) are formed on the substrate (Fig. 5, element 2) sequentially, the protective layer has a thickness d1 (um) in a range of $30 \leq d1 \leq 200$ (Col. 6, lines 5-6), and recording and reproduction are performed with the first and second laser beams from a side of the protective layer (Fig. 13).

In regard to claim 7, Yasuda discloses that a condition of the light absorption ratio $Ac/Aa \geq 1.0$ in the first recording layer is satisfied with respect to the wavelength $\lambda 1$ (nm) of the first laser beam (Col. 22, lines 41, 46).

In regard to claim 8, Yasuda discloses that the first recording layer contains Ge-Sb-Te (Col. 9, line 61-Col. 10, line 9).

In regard to claim 10, Yasuda discloses that the first recording layer has a thickness d2 (nm) in a range of $3 \leq d2 \leq 12$ (Col. 14, lines 52-53).

2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman as applied to claim 1 above, and in further view of Imaino et al (hereafter Imaino) (US 5,555,537).

Yasuda in view of Hasman discloses an optical information recording medium according to claim 1. Hasman mentions use of a 427nm laser beam (Col. 4, lines 40-46) and teaches that any suitable assembly of light sources may be used (Col. 4, lines 49-50) with the optical information recording medium capable of parallel readout. Yasuda in view of Hasman does not disclose that the wavelength $\lambda 1$ (nm) of the first laser beam is in a range of $390 \leq \lambda 1 \leq 520$.

Imaino suggests use of a laser beam with a wavelength $\lambda 1$ in the range of $390 \leq \lambda 1 \leq 520$ and teaches that recording density is increased by shortening the wavelength of a laser beam, which reduces the spot size of the laser beam (Col. 7, lines 46-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to shorten the wavelength $\lambda 1$ of the first laser beam of Yasuda in view of Hasman to a range of $390 \leq \lambda 1 \leq 520$ as suggested by Imaino, the motivation being to reduce the spot size of the first laser beam and increase the recording density of the first recording medium.

3. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman as applied to claim 1 above, and further in view of Akahira et al (hereafter Akihira) (US 5,527,661).

Yasuda in view of Hasman discloses an optical information recording medium according to claim 1. Yasuda in view of Hasman does not disclose that the first recording layer contains Ge-Sb-Te-Sn.

Akahira discloses a phase change information layer made of Ge-Sb-Te-Sn and teaches that Ge-Sb-Te-Sn is a chalcogenide compound that will change in structural phase between an amorphous state and a crystalline state (Col. 8, lines 8-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Ge-Sb-Te-Sn for the first recording layer of Yasuda in view of Hasman as suggested by Akahira, the motivation being to use a material that changes structural phase between an amorphous state and a crystalline state to record information.

4. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani (US 6,030,678) in view of Yasuda and in further view of Kikitsu et al (hereafter Kikitsu) (US 6,240,060).

In regard to claim 1, Aratani discloses an optical information recording medium, with respect to which recording and reproduction are performed with laser beams from one side (Fig. 1), comprising at least two recording layers formed of a phase change material on a substrate (Fig. 1, element 1s), wherein the recording layers include a first recording layer (Fig. 1, element 2s) and a second recording layer (Fig. 1, element 2f) in the order from the side on which the laser beams are incident, the first recording layer is included in a first recording medium (Fig. 1, elements 2s and 3s) and the second recording layer is included in a second recording medium (Fig. 1, elements 2f and 3f), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda 1$ (nm), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda 2$

(nm), a light absorptance of the first recording layer in a crystal state as Ac (%), a light absorptance of the first recording layer in an amorphous state as Aa (%), a light transmittance of the first recording medium with the first recording layer being in the crystal state as Tc (%), a light transmittance of the first recording medium with the first recording layer being in the amorphous state as Ta (%), and the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$ (Col. 4, line 66-Col. 5, line 14), the light transmittance of the first recording layer should be as high as possible with respect to the wavelength $\lambda 2$ in order to obtain a reproduction signal of a high quality from the second recording layer (Col. 2, lines 6-8 and 12-15). The examiner interprets the wavelength $\lambda 1$of the first laser beam to be 655nm (Col. 5, line 11) and the wavelength $\lambda 2$ of the second laser beam to be 770nm (Col. 5, line 3), wherein a separation layer (Fig. 1, element 5) is provided between the first recording medium and the second recording medium, and the thickness of the separation layer is 50μm (Col. 4, line 62). Aratani does not disclose that the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ or that the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$. Aratani also does not disclose that the thickness of the separation layer is in the range between 1μm and 50 μm. It is noted that the difference between the thickness of the separation layer of Aratani and the thickness of a separation layer that would meet the claimed thickness limitation is infinitesimally small.

Yasuda discloses an optical recording medium (Fig. 5, element 10), which is recorded and reproduced by laser beams from one side (Fig. 13), comprising at least two recording layers formed of a phase change material (Fig. 5, elements 11-12) on a substrate (Fig. 5, element 2), wherein the recording layers include a first recording layer (Fig. 5, element 12) and a second

recording layer (Fig. 5, element 11) from the side on which the laser beams are incident (Fig. 13), the first recording layer is included in a first recording medium (Fig. 5, element 6) and the second recording layer is included in a second recording medium (Fig. 5, element 4). Yasuda further discloses that the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength of the laser beam used to record and reproduce to and from the second recording medium (Col. 21, lines 42 and 47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the first recording medium of Aratani to satisfy the conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$ of the laser beam used to record and reproduce to and from the second recording medium as suggested by Yasuda, the motivation being to make the light transmittance of the first recording layer should be as high as possible with respect to the wavelength $\lambda 2$ in order to obtain a reproduction signal of a high quality from the second recording layer.

Yasuda further discloses a separation layer (Fig. 5, element 5) is provided between a first recording medium (Fig. 5, element 6) and a second recording medium (Fig. 5, element 4), and the thickness of the separation layer is in the range between 1μm and 50μm (Col. 15, lines 58-59). More specifically, Yasuda discloses that the thickness of the separation layer is not less than 30 μm so that reflected light from the first recording medium is sufficiently separated from reflected light from the second recording medium while being thin enough that spherical aberration is not produced (Col. 15, lines 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the separation layer of Aratani slightly smaller to account for the

design considerations suggested by Yasuda, the motivation being to make the separation layer thin enough that spherical aberration production is avoided.

Kikitsu discloses a first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength of the laser beam that is used to record/reproduce from the first recording layer to prevent cross-erasure and reduce overwriting jitter (Col. 2, lines 20-29).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the first recording layer of Aratani in view of Yasuda to have a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ used to record/reproduce from the first recording layer as suggested by Kikitsu, the motivation being to prevent cross-erasure and reduce overwriting jitter in the first recording layer.

In regard to claim 4, Aratani discloses that the first recording medium (Fig. 1, elements 2s and 3s) formed on a first substrate (Fig. 1, element 1s) and the second recording medium (Fig. 1, elements 2f and 3f) formed on a second substrate (Fig. 1, element 1f) are bonded to each other (Fig. 1, element 5 and Col. 4, lines 10-15).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani in view of Yasuda in further view of Kikitsu as applied to claim 1 above, and further in view of Welch et al (hereafter Welch) (US 5,384,797).

Aratani in view of Yasuda in further view of Kikitsu discloses the optical information recording medium of claim 1 wherein recording and reproduction are performed with a first laser beam and a second laser beam with different wavelengths. Aratani in view of Yasuda in further view of Kikitsu does not disclose that the first laser beam and a second laser beam are emitted

from a multiwavelength light source in which a part of an optical waveguide of a second harmonic generation element and an optical waveguide of a semiconductor laser are optically coupled.

Welch discloses a multiwavelength light source (Col. 2, lines 62-63) in which a part of an optical waveguide of a second harmonic generation element (Fig. 1, elements 15 and 23; Col. 6, lines 62-63; and Col. 7, line 63-Col. line 4) and an optical waveguide of a semiconductor laser (Fig. 1, element 19) are optically coupled (Fig. 1). Welch discloses that second harmonic generation is an efficient way to double frequency, thereby producing laser beams with different wavelengths.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to produce the first and second laser beams for recording and reproducing in the optical information recording medium of Aratani in view of Yasuda in further view of Kikitsu with the multiwavelength light source of Welch in which a part of an optical waveguide of a second harmonic generation element and an optical waveguide of a semiconductor laser are optically coupled, the motivation being to efficiently produce multiple wavelengths.

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani in view of Yasuda in further view of Kikitsu as applied to claim 1 above, and further in view of Moriya et al (hereafter Moriya) (US 5,726,969).

Aratani discloses that the first recording medium (Fig. 1, elements 2s and 3s) includes at least the first recording layer (Fig. 1, element 2s) and a reflective layer (Fig. 1, element 3s) formed sequentially on the substrate (Fig. 1, element 1s), and the reflective layer has a thickness d3 (nm) in a range of $d3<22$ (Col. 5, lines 66-67). Aratani in view of Yasuda in further view of Kikitsu does not explicitly disclose that the reflective layer has a thickness in the range of $2 \leq d3 \leq 20$.

Moriya discloses an optical information recording medium that includes a first recording medium (Fig. 1, element 102) and a second recording medium (Fig. 1, element 103) with phase change recording layers (Col. 2, lines 55-56) wherein the first recording medium (Fig. 1, element 102) includes at least the first recording layer (Fig. 1, element 105) and a reflective layer (Fig. 1, element 106) formed sequentially on the substrate (Fig. 1, element 104), and the reflective layer has a thickness d3 (nm) in a range of $2 \leq d3 \leq 20$ (Col. 4, lines 28-29). Moriya discloses that the thickness is set so that the reflecting layer will reflect enough light to read the first recording layer while transmitting enough light to read the second recording medium (Col. 4, lines 20-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the recording layer of Aratani in view of Yasuda in further view of Kikitsu in the range $2 \leq d3 \leq 20$, where d3 is the thickness of the reflecting layer in nanometers, the motivation being to set the thickness so that the reflecting layer will reflect enough light to read the first recording layer while transmitting enough light to read the second recording medium.

7. Claims 35-37, 41, 42, 44 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman and in further view of Welch.

In regard to claim 35, Yasuda discloses an optical system comprising: a focusing optical system (Fig. 13, element 34); and an optical information recording medium (Fig. 5, element 10), with respect to which recording and reproduction are performed with laser beams from one side (Fig. 13), the optical information recording medium including at least two recording layers formed of a phase change material (Fig. 5, elements 11-12) on a substrate (Fig. 5, element 2), in which the recording layers include a first recording layer (Fig. 5, element 12) and a second recording layer (Fig. 5, element 11) in order from the side on which the laser beams are incident (Fig. 13), the first

recording layer is included in a first recording medium (Fig. 5, element 6) and the second recording layer is included in a second recording medium (Fig. 5, element 4), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda 1$ (nm), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda 2$ (nm), a light absorptance of the first recording layer in a crystal state as Ac (%), a light absorptance of the first recording layer in an amorphous state as Aa (%), a light transmittance of the first recording medium with the first recording layer being in the crystal state as Tc (%), a light transmittance of the first recording medium with the first recording layer being in the amorphous state as Ta (%), and the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ (Col. 22, lines 41, 46, and 57-61) and the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$ (Col. 21, lines 42 and 47), and a separation layer (Fig. 5, element 5) is provided between the first recording medium and the second recording medium, and the thickness of the separation layer is in the range between 1μm and 50μm (Col. 15, lines 58-59). The examiner notes that in the optical information recording medium of Yasuda, both $\lambda 1$ and $\lambda 2$ are equal to 780nm. Yasuda does not disclose that the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$. Yasuda also does not disclose a multiwavelength light source nor that the beams from the multiwavelength light source are focused on the optical information recording medium by the focusing optical system.

Hasman discloses an optical system comprising: a multiwavelength light source (Fig. 9A, LIGHT SOURCE); a focusing optical system (Fig. 9A, element 91); and an optical information recording medium (Fig. 9A, element 92), which is recorded and reproduced by laser beams from

one side, comprising at least two recording layers formed of a phase change material on a substrate (Col. 8, lines 60-64), wherein the recording layers include a first recording layer and a second recording layer from the side on which the laser beams are incident, the first recording layer is included in a first recording medium and the second recording layer is included in a second recording medium (Fig. 1, element 4), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda 1$ (nm) (Fig. 1, element $\lambda 2$), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda 2$ (nm) (Fig. 1, element $\lambda 1$). Hasman further discloses that the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \preceq |\lambda 1 - \lambda 2| \preceq 120$ (Col. 4, lines 49-52). The examiner notes that Hasman uses laser beams with different wavelengths from the multiwavelength light source and focused on the optical information recording medium by the focusing optical system to enable parallel readout from multiple discs of the optical information recording medium (Col. 2, lines 19-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the optical information recording medium of Yasuda with the focusing optical system and multiwavelength light source having first and second laser beams that have the relationship expressed by $10 \preceq |\lambda 1 - \lambda 2| \preceq 120$ as suggested by Hasman, the motivation being to enable parallel readout from multiple discs of the optical information recording medium and greatly reduce access time. Hasman does not disclose that the multiwavelength light source includes a plurality of coherent light sources with different wavelengths and an optical waveguide device, the optical wave device including a substrate, a plurality of optical waveguides formed in the vicinity of a surface of the substrate, injection parts formed at one end of the optical waveguides,

and emission parts formed on the other end of the optical waveguides the plurality of optical waveguides satisfying phase-matching conditions different from one another, the emission parts of the plurality of optical waveguides being provided at substantially the same position, and wavelengths of beams from the coherent light sources being converted by the optical waveguide device.

Welch discloses a multiwavelength light source including a plurality of coherent light sources with different wavelengths (Fig. 1, element 13a) and an optical waveguide device (Fig. 3, elements 23), the optical wave device including a substrate (Fig. 1, element 11), a plurality of optical waveguides formed in the vicinity of a surface of the substrate (Fig. 3, elements 23), injection parts formed at one end of the optical waveguides, and emission parts formed on the other end of the optical waveguides (Fig. 1), the plurality of optical waveguides satisfying phase-matching conditions different from one another (Col. 2, lines 34-36), the emission parts of the plurality of optical waveguides being provided at substantially the same position (Col. 3, lines 13-14), and wavelengths of beams from the coherent light sources being converted by the optical waveguide device (Col. 3, lines 25-29). It is noted that a laser diode is a coherent light source (see Citation of Relevant Prior Art below). The plurality of optical waveguides are interpreted as satisfying phase-matching conditions different from one another because the plurality of optical waveguides each match the phase of a different wavelength. It is further noted that the design of the multiwavelength light source of Welch is compact.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the multiwavelength light source of Hasman in the optical system of Yasuda in view of Hasman with the multiwavelength light source of Welch, the motivation being to use a multiwavelength light source that is more compact.

In regard to claim 36, Yasuda in view of Hasman and in further view of Welch as applied to claim 35 meets the further limitations of claim 36. Yasuda discloses the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ (Col. 22, lines 41, 46, and 57-61) and the first recording medium satisfies conditions of $Tc \geq 45$ and $Ta \geq 45$ with respect to the wavelength $\lambda 2$ (Col. 21, lines 42 and 47). Hasman discloses a relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 50$ (Col. 4, lines 49-52).

In regard to claim 37, Yasuda discloses that in the optical information recording medium, the second recording medium (Fig. 5, element 4), the first recording medium (Fig. 5, element 6), and the protective layer (Fig. 5, element 7) are formed on the substrate (Fig. 5, element 2) sequentially, the protective layer has a thickness d1 (um) in a range of $30 \leq d1 \leq 200$ (Col. 6, lines 5-6), and recording and reproduction are performed with the first and second laser beams from a side of the protective layer (Fig. 13).

In regard to claim 41, Yasuda discloses that in the optical information recording medium, a condition of the light absorption ratio $Ac/Aa \geq 1.0$ in the first recording layer is satisfied with respect to the wavelength $\lambda 1$ (nm) of the first laser beam (Col. 22, lines 41, 46).

In regard to claim 42, Yasuda discloses that the first recording layer in the optical information recording medium contains Ge-Sb-Te (Col. 9, line 61-Col. 10, line 9).

In regard to claim 44, Yasuda discloses that in the optical information recording medium, the first recording layer has a thickness d2 (nm) in a range of $3 \leq d2 \leq 12$ (Col. 14, lines 52-53).

In regard to claim 46, Hasman discloses that the optical information recording medium is recorded or reproduced simultaneously with beams with a plurality of wavelengths from the multiwavelength source (Col. 2, lines 19-21).

8. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman and further in view of Welch as applied to claim 35 above, and in further view of Imaino.

Yasuda in view of Hasman and in further view of Welch discloses an optical information recording medium according to claim 35. Hasman mentions use of a 427nm laser beam (Col. 4, lines 40-46) and teaches that any suitable assembly of light sources may be used (Col. 4, lines 49-50) with the optical information recording medium capable of parallel readout. Yasuda in view of Hasman does not disclose that the wavelength $\lambda 1$ (nm) of the first laser beam is in a range of $390 \leq \lambda 1 \leq 520$.

Imaino suggests use of a laser beam with a wavelength $\lambda 1$ in the range of $390 \leq \lambda 1 \leq 520$ and teaches that recording density is increased by shortening the wavelength of a laser beam, which reduces the spot size of the laser beam (Col. 7, lines 46-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to shorten the wavelength $\lambda 1$ of the first laser beam of Yasuda in view of Hasman and in further view of Welch to a range of $390 \leq \lambda 1 \leq 520$ as suggested by Imaino, the motivation being to reduce the spot size of the first laser beam and increase the recording density of the first recording medium.

9. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman and in further view of Welch as applied to claim 35 above, and further in view of Akahira.

Yasuda in view of Hasman and in further view of Welch discloses an optical information recording medium according to claim 35. Yasuda in view of Hasman and in further view of Welch does not disclose that the first recording layer contains Ge-Sb-Te-Sn.

Akahira discloses a phase change information layer made of Ge-Sb-Te-Sn and teaches that Ge-Sb-Te-Sn is a chalcogenide compound that will change in structural phase between an amorphous state and a crystalline state (Col. 8, lines 8-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Ge-Sb-Te-Sn for the first recording layer of Yasuda in view of Hasman and in further view of Welch as suggested by Akahira, the motivation being to use a material that changes structural phase between an amorphous state and a crystalline state to record information.

10. Claims 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman and in further view of Welch as applied to claim 35 above, and further in view of Takeuchi (US 6,424,608).

In regard to claim 47, Yasuda in view of Hasman and in further view of Welch disclose the optical system of claim 35, wherein the optical information recording medium is recorded and reproduced with laser beams from a multiwavelength light source. Yasuda in view of Hasman and in further view of Welch does not disclose that the optical information recording medium is recorded with at least one beam with a wavelength from the multiwavelength light source and simultaneously information is detected from the optical information recording medium with a beam with another wavelength from the multiwavelength light source.

Takeuchi discloses recording an optical information recording medium (Fig. 2, element D) with at least one beam with a wavelength (Fig. 3, RECORDING BEAM) and simultaneously detecting information from the optical information recording medium with a beam with another

wavelength (Fig. 3, SERVO BEAM; Col. 2, lines 26-30; and Col. 4, lines 33-36). Takeuchi teaches that doing so allows monitoring of a recording state while data is recorded and appropriate adjustment of focusing or intensity (Col. 2, lines 21-30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to record the optical information recording medium with at least one beam with a wavelength from the multiwavelength light source and simultaneously detect information from the optical information recording medium with a beam with another wavelength from the multiwavelength light source in the optical system of Yasuda in view of Hasman and in further view of Welch as suggested by Takeuchi, the motivation being to enable monitoring of a recording state while data is recorded and appropriate adjustment of focusing or intensity.

In regard to claim 48, Takeuchi discloses that based on signals detected by the beam with another wavelength from the multiwavelength light source, intensity of at least one beam with a wavelength is controlled (Col. 2, lines 26-30). It is noted that in the optical system of Yasuda in view of Hasman and in further view of Welch and in further view of Takeuchi, laser beams are emitted by the multiwavelength light source of Welch.

In regard to claim 49, Takeuchi discloses that based on signals detected by the beam with another wavelength from the multiwavelength light source, a focal point on the optical information recording medium of the at least one beam with a wavelength is controlled (Col. 2, lines 26-30). It is noted that in the optical system of Yasuda in view of Hasman and in further view of Welch and in further view of Takeuchi, laser beams are emitted by the multiwavelength light source of Welch.

11. Claims 47, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda in view of Hasman and in further view of Welch as applied to claim 35 above, and further in view of Ojima et al (hereafter Ojima) (US 4,908,813).

In regard to claim 47, Yasuda in view of Hasman and in further view of Welch disclose the optical system of claim 35. Yasuda in view of Hasman and in further view of Welch does not disclose that the optical information recording medium is recorded with at least one beam with a wavelength from the multiwavelength light source and simultaneously information is detected from the optical information recording medium with a beam with another wavelength from the multiwavelength light source.

Ojima discloses recording an optical information recording medium (Fig. 2, element 1) with at least one beam with a wavelength (Col. 4, lines 20-25 and Col. 6, lines 34-36) from the multiwavelength light source (Fig. 2, elements 6 and 8) and simultaneously detecting information from the optical information recording medium with a beam with another wavelength from the multiwavelength light source (Col. 4, lines 9-14 and Col. 6, lines 37-40). Ojima teaches that doing so enables automatic focusing through detection of focal point bias (Col. 3, line 60 and Col. 4, line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to record the optical information recording medium with at least one beam with a wavelength from the multiwavelength light source and simultaneously detect information from the optical information recording medium with a beam with another wavelength from the multiwavelength light source in the optical system of Yasuda in view of Hasman and in further view of Welch as suggested by Ojima, the motivation being to enable automatic focusing through detection of focal point bias.

In regard to claim 49, Ojima discloses that based on signals detected by the beam with another wavelength from the multiwavelength light source, a focal point on the optical information

recording medium of the at least one beam with a wavelength is controlled (Col. 3, line 60 and Col. 4, lines 9-14).

In regard to claim 50, Yasuda in view of Hasman and further in view of Welch and further in view of Ojima as applied to claim 47 does not disclose that beams with a plurality of wavelengths from the multiwavelength light source are mixed, with which the optical information recording medium is recorded.

Ojima discloses that beams with a plurality of wavelengths (Fig. 2, elements 51-53) from the multiwavelength light source (Fig. 2, elements 6 and 8) are mixed (Col. 3, lines 21-23), with which the optical information recording medium is recorded (Col. 4, lines 20-23) and teaches that by doing so, the information transfer rate is enhanced (Col. 4, lines 23-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to record the optical information recording medium in the optical system of Yasuda in view of Hasman and further in view of Welch and further in view of Ojima as applied to cliam 47 with mixed beams with a plurality of wavelengths from the multiwavelength light source as further suggested by Ojima, the motivation being to enhance the information transfer rate.

12. Claims 35, 38, 39 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani in view of Yasuda and in further view of Kikitsu and in further view of Hasman and in further view of Welch.

In regard to claim 35, Aratani discloses an optical system comprising: an optical information recording medium, with respect to which recording and reproduction are performed with laser beams from one side (Fig. 1), the optical information recording medium including at least two recording layers formed of a phase change material on a substrate (Fig. 1, element 1s), in which the recording layers include a first recording layer (Fig. 1, element 2s) and a second

recording layer (Fig. 1, element 2f) in the order from the side on which the laser beams are incident, the first recording layer is included in a first recording medium (Fig. 1, elements 2s and 3s) and the second recording layer is included in a second recording medium (Fig. 1, elements 2f and 3f), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as $\lambda 1$ (nm), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as $\lambda 2$ (nm), a light absorptance of the first recording layer in a crystal state as Ac (%), a light absorptance of the first recording layer in an amorphous state as Aa (%), a light transmittance of the first recording medium with the first recording layer being in the crystal state as Tc (%), a light transmittance of the first recording medium with the first recording layer being in the amorphous state as Ta (%), and the relationship between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ is expressed by $10 \leq |\lambda 1 - \lambda 2| \leq 120$ (Col. 4, line 66-Col. 5, line 14), the light transmittance of the first recording layer should be as high as possible with respect to the wavelength $\lambda 2$ in order to obtain a reproduction signal of a high quality from the second recording layer (Col. 2, lines 6-8 and 12-15). The examiner interprets the wavelength $\lambda 1$of the first laser beam to be 655nm (Col. 5, line 11) and the wavelength $\lambda 2$ of the second laser beam to be 770nm (Col. 5, line 3), and a separation layer (Fig. 1, element 5) is provided between the first recording medium and the second recording medium, and the thickness of the separation layer is 50μm (Col. 4, line 62). Aratani does not disclose that the first recording layer has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ or that the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$. Aratani also does not disclose that the thickness of the separation layer is in the range between 1μm and 50 μm. It is noted that the difference

between the thickness of the separation layer of Aratani and the thickness of a separation layer that would meet the claimed thickness limitation is infinitesimally small. Aratani does not disclose a multiwavelength light source, a focusing optical system, nor that beams from the multiwavelength light source are focused on the optical information recording medium by the focusing optical system.

Yasuda discloses an optical information recording medium (Fig. 5, element 10), which is recorded and reproduced by laser beams from one side (Fig. 13), comprising at least two recording layers formed of a phase change material (Fig. 5, elements 11-12) on a substrate (Fig. 5, element 2), wherein the recording layers include a first recording layer (Fig. 5, element 12) and a second recording layer (Fig. 5, element 11) from the side on which the laser beams are incident (Fig. 13), the first recording layer is included in a first recording medium (Fig. 5, element 6) and the second recording layer is included in a second recording medium (Fig. 5, element 4). Yasuda further discloses that the first recording medium satisfies conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength of the laser beam used to record and reproduce to and from the second recording medium (Col. 21, lines 42 and 47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the first recording medium of Aratani to satisfy the conditions of $Tc \geq 30$ and $Ta \geq 30$ with respect to the wavelength $\lambda 2$ of the laser beam used to record and reproduce to and from the second recording medium as suggested by Yasuda, the motivation being to make the light transmittance of the first recording layer should be as high as possible with respect to the wavelength $\lambda 2$ in order to obtain a reproduction signal of a high quality from the second recording layer.

Yasuda further discloses a separation layer (Fig. 5, element 5) is provided between a first recording medium (Fig. 5, element 6) and a second recording medium (Fig. 5, element 4), and the thickness of the separation layer is in the range between 1μm and 50μm (Col. 15, lines 58-59). More specifically, Yasuda discloses that the thickness of the separation layer is not less than 30 μm so that reflected light from the first recording medium is sufficiently separated from reflected light from the second recording medium while being thin enough that spherical aberration is not produced (Col. 15, lines 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the separation layer of Aratani slightly smaller to account for the design considerations suggested by Yasuda, the motivation being to make the separation layer thin enough that spherical aberration production is avoided.

Kikitsu discloses a first recording layer that has a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength of the laser beam that is used to record/reproduce from the first recording layer to prevent cross-erasure and reduce overwriting jitter (Col. 2, lines 20-29).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the first recording layer of Aratani in view of Yasuda to have a light absorption ratio Ac/Aa in a predetermined range with respect to the wavelength $\lambda 1$ used to record/reproduce from the first recording layer as suggested by Kikitsu, the motivation being to prevent cross-erasure and reduce overwriting jitter in the first recording layer.

Hasman discloses an optical system comprising: a multiwavelength light source (Fig. 9A, LIGHT SOURCE); a focusing optical system (Fig. 9A, element 91); and an optical information recording medium (Fig. 9A, element 92), which is recorded and reproduced by laser beams from

one side, comprising at least two recording layers formed of a phase change material on a substrate (Col. 8, lines 60-64), wherein the recording layers include a first recording layer and a second recording layer from the side on which the laser beams are incident, the first recording layer is included in a first recording medium and the second recording layer is included in a second recording medium (Fig. 1, element 4), when a wavelength of a first laser beam with which recording and reproduction are performed with respect to the first recording medium is indicated as λ1 (nm) (Fig. 1, element λ2), a wavelength of a second laser beam with which the second recording medium is recorded and reproduced as λ2 (nm) (Fig. 1, element λ1). Hasman further discloses that beams from the multiwavelength light source are focused on the optical information recording medium by the focusing optical system (Fig. 9A). The examiner notes that Hasman uses laser beams with different wavelengths from the multiwavelength light source and focused by the focusing optical system to enable parallel readout from multiple discs of the optical information recording medium (Col. 2, lines 19-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the optical information recording medium of Aratani in view of Yasuda and further in view of Kikitsu with the focusing optical system and multiwavelength light source having first and second laser beams as suggested by Hasman, the motivation being to enable parallel readout from multiple discs of the optical information recording medium and greatly reduce access time. Hasman does not disclose that the multiwavelength light source includes a plurality of coherent light sources with different wavelengths and an optical waveguide device, the optical wave device including a substrate, a plurality of optical waveguides formed in the vicinity of a surface of the substrate, injection parts formed at one end of the optical waveguides, and emission parts formed on the other end of the optical waveguides the plurality of optical

waveguides satisfying phase-matching conditions different from one another, the emission parts of the plurality of optical waveguides being provided at substantially the same position, and wavelengths of beams from the coherent light sources being converted by the optical waveguide device.

Welch discloses a multiwavelength light source including a plurality of coherent light sources with different wavelengths (Fig. 1, element 13a) and an optical waveguide device (Fig. 3, elements 23), the optical wave device including a substrate (Fig. 1, element 11), a plurality of optical waveguides formed in the vicinity of a surface of the substrate (Fig. 3, elements 23), injection parts formed at one end of the optical waveguides, and emission parts formed on the other end of the optical waveguides (Fig. 1), the plurality of optical waveguides satisfying phase-matching conditions different from one another (Col. 2, lines 34-36), the emission parts of the plurality of optical waveguides being provided at substantially the same position (Col. 3, lines 13-14), and wavelengths of beams from the coherent light sources being converted by the optical waveguide device (Col. 3, lines 25-29). It is noted that a laser diode is a coherent light source (see Citation of Relevant Prior Art below). The plurality of optical waveguides are interpreted as satisfying phase-matching conditions different from one another because the plurality of optical waveguides each match the phase of a different wavelength. It is further noted that the design of the multiwavelength light source of Welch is compact.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the multiwavelength light source of Hasman in the optical system of Aratani in view of Yasuda and further in view of Kikitsu and further in view of Hasman with the multiwavelength light source of Welch, the motivation being to use a multiwavelength light source that is more compact.

In regard to claim 38, Aratani discloses that in the optical information recording medium, the first recording medium (Fig. 1, elements 2s and 3s) formed on a first substrate (Fig. 1, element 1s) and the second recording medium (Fig. 1, elements 2f and 3f) formed on a second substrate (Fig. 1, element 1f) are bonded to each other (Fig. 1, element 5 and Col. 4, lines 10-15).

In regard to claim 39, Aratani in view of Yasuda and in further view of Kikitsu and in further view of Hasman and in further view of Welch discloses the optical information recording medium of claim 35 wherein recording and reproduction are performed with a first and second laser beams emitted from the multiwavelength source of Welch. Welch discloses that in the multiwavelength light source (Col. 2, lines 62-63), a part of an optical waveguide of a second harmonic generation element (Fig. 1, elements 15 and 23; Col. 6, lines 62-63; and Col. 7, line 63-Col. line 4) and an optical waveguide of a semiconductor laser (Fig. 1, element 19) are optically coupled (Fig. 1).

In regard to claim 46, Hasman discloses that the optical information recording medium is recorded or reproduced simultaneously with beams with a plurality of wavelengths from the multiwavelength source (Col. 2, lines 19-21).

13. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani in view of Yasuda and in further view of Kikitsu and in further view of Hasman and in further view of Welch as applied to claim 35 above, and further in view of Moriya.

Aratani discloses that the first recording medium (Fig. 1, elements 2s and 3s) in the optical information recording medium includes at least the first recording layer (Fig. 1, element 2s) and a reflective layer (Fig. 1, element 3s) formed sequentially on the substrate (Fig. 1, element 1s), and the reflective layer has a thickness d3 (nm) in a range of d3<22 (Col. 5, lines 66-67). Aratani in

view of Yasuda in further view of Kikitsu and in further view of Hasman and in further view of Welch does not explicitly disclose that the reflective layer has a thickness in the range of $2 \leq d3 \leq 20$.

Moriya discloses an optical information recording medium that includes a first recording medium (Fig. 1, element 102) and a second recording medium (Fig. 1, element 103) with phase change recording layers (Col. 2, lines 55-56) wherein the first recording medium (Fig. 1, element 102) includes at least the first recording layer (Fig. 1, element 105) and a reflective layer (Fig. 1, element 106) formed sequentially on the substrate (Fig. 1, element 104), and the reflective layer has a thickness d3 (nm) in a range of $2 \leq d3 \leq 20$ (Col. 4, lines 28-29). Moriya discloses that the thickness is set so that the reflecting layer will reflect enough light to read the first recording layer while transmitting enough light to read the second recording medium (Col. 4, lines 20-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the recording layer of Aratani in view of Yasuda and in further view of Kikitsu and in further view of Hasman and in further view of Welch in the range $2 \leq d3 \leq 20$, where d3 is the thickness of the reflecting layer in nanometers, the motivation being to set the thickness so that the reflecting layer will reflect enough light to read the first recording layer while transmitting enough light to read the second recording medium.

Citation of Relevant Prior Art

14. Ishizuka et al (US 5,930,066) discloses that a laser diode is a coherent light source (Col. 4). Mito et al (US 4,318,058) and Gupta (US 5,761,226) disclose multiwavelength light sources including a plurality of coherent light sources with different wavelengths and an optical waveguide device including a substrate.

Response to Arguments

15. Applicant's arguments, filed June 4, 2004, with respect to the rejections under 35 USC 103(a) as being unpatentable over Yasuda in view of Hasman and the rejections dependent thereon have been considered but they are not persuasive because Yasuda discloses a separation layer (Fig. 5, element 5) that is provided between the first recording medium (Fig. 5, element 6) and the second recording medium (Fig. 5, element 4), and the thickness of the separation layer is in the range between 1μm and 50μm (Col. 15, lines 58-59).

16. Applicant's arguments, filed June 4, 2004, with respect to the rejections under 35 USC 103(a) as being unpatentable over Aratani in view of Yasuda and further in view of Kikitsu and the rejections dependent thereon have been fully considered but they are not persuasive because Aratani in view of Yasuda discloses discloses a separation layer meeting the claim limitations (see above).

17. Applicant's arguments, filed June 4, 2004, with respect to claim 35 and the claims dependent thereon have been fully considered but they are not persuasive because they rely on the allowability of rejected claim 1.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V Battaglia whose telephone number is (703) 305-4534. The examiner can normally be reached on 5-4/9 Plan with 1st Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Michael Battaglia

Michael V. Battaglia

HOA T. NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600
8/7/04